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10/561,390	12/19/2005	Takeshi Obata	NEC 70191	6521

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EXAMINER	
WANG, EUGENIA	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/561,390	OBATA ET AL.	
	Examiner	Art Unit	
	EUGENIA WANG	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) *8-15 and 24-45* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 16-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/19/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 8-15 and 24-45 withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions/species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on July 28, 2009.

Response to Arguments

2. Applicant's election with traverse of Group 1, Species A (claims 1-7 and 16-23) in the reply filed on July 28, 2009 is acknowledged. The traversal is on the ground(s) that all of the claims were examined in the International Search Report. This is not found persuasive because just because the International Search Report examined all of the groups does not mean that they do not have distinct special technical features (as set forth within the original restriction requirement. Furthermore, Applicant has not provided any reasoning as to how the groups do share the same special technical feature (in response to the restriction requirement, which clearly sets forth a difference in special technical feature).

The requirement is still deemed proper and is therefore made FINAL.

Preliminary Amendment

3. The Preliminary Amendment Received December 19, 2005 is acknowledged.

Priority

4. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

5. The information disclosure statements filed December 19, 2005 has been placed in the application file and the information referred to therein has been considered as to the merits.

Drawings

6. The Drawings submitted December 19, 2005 are acceptable.

Specification

7. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

8. The disclosure is objected to because of the following informalities: (1) a typographical error on p 27, line 12, which defines an electrode terminal as 667d (wherein Examiner submits that “667b” was meant) and (2) a typographical error on p 44, line 20, wherein the word “tank” should be inserted between the words “electrode” and “662”, as 662 is used to identify the fuel electrode tank and not the fuel electrode.

Appropriate correction is required.

Claim Objections

9. Claim 3 objected to because of the following informalities: it has awkward wording, specifically with the phrase "placed at outside" (line 2-3). Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 1-7 and 16-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 1 recites the limitation "the wall" in line 6. There is insufficient antecedent basis for this limitation in the claim. Since claims 2-7 and 16-23 are dependent upon claim 1 and fail to rectify the issue, they are rejected for the same reason as well.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1-3, 6-7, 18, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6306285 (Narayanan et al.) either as evidenced by or in view of US 2003/0157385 (Beckmann et al.) and in view of US 6303244 (Surampudi et al.).

As to claim 1, Narayanan et al. teach of a concentration sensor for a liquid feed fuel cell (abs). As seen in fig. 1, Narayanan et al. teach of the typical fuel cell including a fuel cell main body (MEA [150]), which has electrolyte membrane (preferably a polymer) [120] with an anode [110] (fuel electrode) and cathode [130] (oxidant electrode) attached to it (fig. 1; col. 1, lines 25-28 and 34-46). There is a container containing liquid fuel having an alcohol (methanol) (methanol tank [1120]) (fig. 1; col. 1, lines 47-53). The concentration sensor embodied for use in such a fuel cell is disclosed, wherein the sensor uses a polymer electrolyte membrane [250], such as Nafion (polymer membrane having proton conductivity) (fig. 2; col. 4, lines 29-41). The sensor circuit (concentration detection unit) is also described (in how concentration is measured), which includes having the sensor immersed in the fuel (fuel bath [240]) and

wherein a current measuring device (such as an ammeter or voltmeter) is used to measure current, wherein afterwards a mathematical equation is used to determine the closest methanol concentration corresponding to the measured current (fig. 4A-4B; col. 5, lines 10-58).

Narayanan et al. does not (a) specifically mention using conductivity to determine calculation or (b) teach where the concentration sensor is placed (inside the container or at a wall portion of the container).

With respect to (a), Beckmann et al. is (1) used as an evidentiary piece to show that the measurement of current does correspond to resistance, which is related to conductivity, as it is the resistivity is the inverse of conductivity (and thus the use of resistance is inherently present in Narayanan et al.). Alternately, Beckmann et al. is (2) used to at least obviate the use of resistance to determine concentration. With respect to (1): It is first reiterated that Narayanan et al uses current and voltage measurements to determine concentration, wherein voltage, current and resistance are all related (V=IR), and thus the use of current (I) or voltage (V) at the very least is indirectly linked to the resistance (R). Beckmann et al. is relied upon as an evidentiary piece, as they teach of a similar concentration sensor. As seen in fig. 8, Nafion is used within a circuit, wherein current passes through it, and resistance is used to determine the concentration (para 0065; fig. 8). Accordingly, Beckmann et al. uses the same type of sensor as Narayanan et al., as it is used in the same type of circuit and operated in the same manner. Accordingly, in this interpretation Beckmann et al. is only seen as an

evidentiary piece to show the "mathematical equation" of Narayanan et al., which takes into account resistance.

Alternately, if it is shown that Narayanan et al. does not rely on resistance at all, the use of resistance would have alternately been obvious. Accordingly, with respect to (2): Beckmann et al. teach of a similar concentration sensor to Narayanan et al. As seen in fig. 8, Nafion is used within a circuit, wherein current passes through it, and resistance is used to determine the concentration (para 0065; fig. 8). Beckmann et al. shows that one of ordinary skill in the art would have found it obvious to use Nafion (proton conducting polymer) to determine concentration using a calculation involving resistance, and thus sets forth that the substitution of using resistance of Nafion to determine concentration would have yielded the predictable result of having a concentration sensor that operated as such. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made replace the type of measurement used by Narayanan et al. (which in this alternate interpretation does not depend on resistance) with that of Beckmann et al. (which does depend on resistance), as the substitution would have yielded the predictable result of providing a sensor that would operate as such (a concentration determining sensor).

With respect to (b), Surampudi et al. teach of a fuel cell system with a methanol concentration, wherein the concentration sensor [916] is located either in the methanol or very close to it (col. 18, lines 14-19; fig. 9). The motivation for putting the sensor in or near the container (construed to be "at the wall portion" barring specification as to what this phrase pertains to) is in order to determine the concentration of the circulation tank

(which is the fuel fed to the fuel cell) in order to properly control operation of the system (col. 18, lines 14-19). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to put the methanol concentration sensor in/near the tank of fuel fed to the fuel cell in order to obtain proper concentration measurements of the fuel fed to the fuel cell and to appropriately use such numbers to control the operation of the system.

As to claim 2, the combination teaches such a limitation, as Narayanan et al. teach that the sensor circuit (concentration detection unit) has a pair of terminals [460, 465] attached the electrodes [260, 270] (and thus is indirectly contacted with the electrolyte membrane, which resides in the membrane electrode assembly of 210) (fig. 2; fig. 4B; col. 5, lines 23-24). (As set forth in the rejection to claim 1, the current measurement of Narayanan et al. either inherently uses resistance, or else the use of resistance would be obvious (Beckmann et al., also uses terminals, labeled (+) and (-), like Narayanan et al.). See the rejection to claim 1 for further details.)

As to claim 3, the combination teaches such a limitation, as Surampudi et al. was used to obviate the use of the concentration sensor both inside and near the container (outside). (See fig. 9, wherein the sensor [916] is outside of the circulation tank [906] as well as col. 18, lines 14-19 to the teaching). See the rejection to claim 1 for full details of the combination made.

As to claim 6, the combination teaches such a limitation, as Narayanan et al.'s sensor circuit has an embodiment wherein multiple sensors are used (and thus has multiple membranes, one for each sensor). It is also noted that within this setup,

second sensor element [520] is a sensor of temperature (and thus takes the temperature of the liquid fuel into consideration. See fig. 5A-5B; col. 6, lines 1-32.

As to claim 7, it is noted that Both Narayanan et al. and Beckmann et al. embody the use of Nafion as the membrane of their concentration sensors (see col. 4, lines 29-29-31 of Narayanan et al.; see para 0065 of Beckmann et al.). Although neither reference mentions that Nafion includes a protoic acid group, such a characteristic is inherent to the material (Nafion).

Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection.

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

In the case of the instant application the basis for expectation of inherency is that Nafion is perfluorosulfonic acid based compound (protonic acid group). Furthermore, it is the same material embodied by Applicant (see p 4, lines 22-26 wherein a protonic

acid group is used as the polymer membrane and example 1, 40, lines 1-15, wherein Nafion is used.)

The Examiner invites applicant to provide that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product.

Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]." The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

As to claim 18, it is first noted that Narayanan et al. teach of a different concentration fuel storage unit (anode chamber [180]) (fig. 1). (It inherently stores a different alcohol concentration than the container (methanol tank [1120]), as they are different storage chambers, wherein both are fed differently, and thus at least a slight difference must exist.) Methanol/water pump [170] serves as the supply unit which supplies the liquid fuel from the container (methanol tank [1120]) to the different concentration fuel storage unit (anode chamber [180]). As seen in fig. 4b, the sensor device [410] is connected to the control electronics [470], which runs the fuel metering [480], which controls fuel delivery (fig. 4B, col. 5, lines 59-67).

As to claim 21, the combination teaches such a limitation, as Narayanan et al.'s sensor circuit has an embodiment wherein temperature variations are compensated for

using a thermocouple [440] and wherein the concentration detector corrects for the temperature (fig. 4B; col. 5, lines 46-58).

13. Claim 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Narayanan et al. as evidenced by/in view of Beckmann et al. in further view of Surampudi et al. as applied to claim1 above, and further in view of US 2002/0110713 (Reindl et al.).

As to claim 4 none of Narayanan et al., Beckmann et al., and Surampudi et al. teaches of having hydrophobic membrane covering the electrode terminals.

Reindl et al. teach of a concentration sensor within a fuel cell environment (abs). (It is noted that although Reindl et al. specifically embodies a gas using system, and a sensor directed to gas concentration, Reindl et al. is still seen as combinable as it is directed towards concentration sensors in general, as used in fuel cell environments, and even recognizes that liquid fuels can be used (abs; para 0003).) Reindl et al. teach that the sensor is provided with a protective, hydrophobic screen (para 0050, lines 9-29). The motivation for using the protective screen of (as taught by Reindl et al.) on the sensor of Narayanan et al. (including the electrode terminals) is in order to provide protection from corrosive elements within the fuel cell environment and to keep water from gathering on the sensor (para 0050, lines 9-11 and 17-26). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to apply the hydrophobic covering of Reindl et al. to the sensor system of Narayanan et al. (including the electrodes) in order to provide mechanical strength against corrosive materials as well as to keep water from gathering on the sensor.

14. Claims 16-17 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Narayanan et al. as evidenced by/in view of Beckmann et al. in further view of Surampudi et al. as applied to claims 1 and 18 above, and further in view of US 2003/0129464 (Becerra et al.).

As to claim 16, none of Narayanan et al., Beckmann et al., and Surampudi et al. teaches of having a detectable cartridge from the main body (wherein the container is provided in the cartridge).

Becerra et al. teach of a system that is similar to that of Narayanan et al.'s, as seen in fig. 11, wherein inner cartridge [1104] is similar to that of tank [1120] of Narayanan et al. (as it provides fuel and recirculation). However, Becerra et al.'s cartridge [1104] is detachable and replaceable (para 0056, lines 10-20). The motivation for wanting to use such a replaceable cartridge is in order to be able to replace and supply fuel when necessary and to be able to use lower concentration fuels (para 0013, lines 10-14; para 0056, lines 16-20). This would thus improve the ease of supplying fuel and improve the safety of the device (as higher concentrations of methanol would be more dangerous, as they would be more susceptible to explosion, etc.) Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the detachable cartridge of Becerra et al. in order to provide a fuel cell system which can be provided fuel as necessary, wherein a lower concentration of fuel can be used (thus enhancing the ease of use and safety). At the very least, Becerra et al. teach that one of ordinary skill in the art would recognize that both replaceable and non-replaceable fuel cartridges can be used (as it embodies both).

(See para 0013. Also note figs 11 and 12 are the only embodiments said to have replaceable cartridges (see para 0056), wherein many other embodiments are shown and are not detachable (see figs 5-8).) Accordingly, at the very least the substitution of a detachable/replaceable fuel container/cartridge for a non-replaceable fuel container would have yielded the predictable result of having a fuel container that would provide fuel to the fuel cell. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to replace the methanol tank of Narayanan et al. with one that is detachable, as such a substitution would have yielded the predictable result of having a fuel container/cartridge that would operate in the same manner (provide fuel to the anode).

As to claim 17, it is first noted that Narayanan et al. teach of a fuel electrode tank (anode chamber [180]) (fig. 1), which is separate from the container (methanol tank [1120]). The conduit between the pump [170] and anode chamber [180] can be interpreted to be a fuel injection inlet, which allows the liquid fuel to be delivered the fuel electrode (anode [110]). The conduit between the methanol tank [1120] (container) and the pump [170] constitutes a fitting unit, as it connects the injection inlet of the fuel electrode tank (anode chamber [180]), via the pump [170]). It is noted that the junction of the pump [170] and the conduit leading to anode chamber [180] constitutes a second connection unit

None of Narayanan et al., Beckmann et al., and Surampudi et al. teaches of having a detectable cartridge from the main body (wherein the container is provided in the cartridge).

Becerra et al. teach of a system that is similar to that of Narayanan et al.'s, as seen in fig. 11, wherein inner cartridge [1104] is similar to that of tank [1120] of Narayanan et al. (as it provides fuel and recirculation). However, Becerra et al.'s cartridge [1104] is detachable and replaceable (para 0056, lines 10-20). The motivation for wanting to use such a replaceable cartridge/container9 is in order to be able to replace and supply fuel when necessary and to be able to use lower concentration fuels (para 0013, lines 10-14; para 0056, lines 16-20). This would thus improve the ease of supplying fuel and improve the safety of the device (as higher concentrations of methanol would be more dangerous, as they would be more susceptible to explosion, etc.) Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the detachable cartridge of Becerra et al. in order to provide a fuel cell system which can be provided fuel as necessary, wherein a lower concentration of fuel can be used (thus enhancing the ease of use and safety). At the very least, Becerra et al. teach that one of ordinary skill in the art would recognize that both replaceable and non-replaceable fuel cartridges can be used (as it embodies both). (See para 0013. Also note figs 11 and 12 are the only embodiments said to have replaceable cartridges (see para 0056), wherein many other embodiments are shown and are not detachable (see figs 5-8).) Accordingly, at the very least the substitution of a detachable/replaceable fuel container/cartridge for a non-replaceable fuel container would have yielded the predictable result of having a fuel container that would provide fuel to the fuel cell. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to replace the

methanol tank of Narayanan et al. with one that is detachable, as such a substitution would have yielded the predictable result of having a fuel container/cartridge that would operate in the same manner (provide fuel to the anode).

As to claim 19, it is first noted that Narayanan et al. teach of a fuel electrode tank (anode chamber [180]) (fig. 1). The conduit between the pump [170] and anode chamber [180] can be interpreted to be a fuel injection inlet, which allows the liquid fuel to be delivered the fuel cell main body (MEA [150]). The conduit between the methanol tank [1120] (container) and the pump [170] constitutes an fitting unit and first connection unit, as it connects the injection inlet of the fuel electrode tank (anode chamber [180]), via the pump [170], which is also the supply unit (and thus connected to said supply unit). It is noted that the junction of the pump [170] and the conduit leading to anode chamber [180] constitutes a second connection unit. It is noted that the anode chamber [180] (different concentration fuel storage unit) is considered to be detachable from the supply unit (pump [170]), as they are different parts and thus can/are capable of being separated (as they are put together).

It has been held that the recitation of an element is "capable" of performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson,* 69 USPQ 138.

While intended use recitations and other types of functional language cannot be entirely disregarded. However, in apparatus, article, and composition claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art

structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. In re Casey, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963).

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). See also MPEP § 2114.

The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989).

None of Narayanan et al., Beckmann et al., and Surampudi et al. teaches of having a detectable container.

Becerra et al. teach of a system that is similar to that of Narayanan et al.'s, as seen in fig. 11, wherein inner cartridge [1104] is similar to that of tank [1120] (container)

of Narayanan et al. (as it provides fuel and recirculation). However, Becerra et al.'s cartridge [1104] is detachable and replaceable (para 0056, lines 10-20). The motivation for wanting to use such a replaceable cartridge/containe9 is in order to be able to replace and supply fuel when necessary and to be able to use lower concentration fuels (para 0013, lines 10-14; para 0056, lines 16-20). This would thus improve the ease of supplying fuel and improve the safety of the device (as higher concentrations of methanol would be more dangerous, as they would be more susceptible to explosion, etc.) Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the detachable cartridge of Becerra et al. in order to provide a fuel cell system which can be provided fuel as necessary, wherein a lower concentration of fuel can be used (thus enhancing the ease of use and safety). At the very least, Becerra et al. teach that one of ordinary skill in the art would recognize that both replaceable and non-replaceable fuel cartridges can be used (as it embodies both). (See para 0013. Also note figs 11 and 12 are the only embodiments said to have replaceable cartridges (see para 0056), wherein many other embodiments are shown and are not detachable (see figs 5-8).) Accordingly, at the very least the substitution of a detachable/replaceable fuel container/cartridge for a non-replaceable fuel container would have yielded the predictable result of having a fuel container that would provide fuel to the fuel cell. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to replace the methanol tank of Narayanan et al. with one that is detachable, as such a substitution

would have yielded the predictable result of having a fuel container/cartridge that would operate in the same manner (provide fuel to the anode).

As to claim 20, the combination teaches such a limitation, as Narayanan et al.'s fuel cell (fig. 1) is all connected, and thus united, in some manner (and thus the container (methanol tank [1120] and different concentration fuel storage unit (anode chamber [180])) can be said to be united in some manner, barring specification as to what constitutes being unitedly formed. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989).

15. Claim 22 rejected under 35 U.S.C. 103(a) as being unpatentable over Narayanan et al. as evidenced by/in view of Beckmann et al. in further view of Surampudi et al. as applied to claim1 above, and further in view of US 2003/0134162 (Gore et al.)

As to claim 22, it is first noted that Narayanan et al. teach that the concentration, as measured, preferably monitors another relationship that affects concentration (in this case temperature) and uses its input to make an appropriate determination of concentration (col. 5, lines 47-58). None of Narayanan et al., Beckmann et al., and Surampudi et al. specifically teach of using a pH and a pH measurement unit to provide such a corrective factor to concentration.

However Gore et al. teach that pH is a characteristic of fuel that helps to determine methanol concentration (para 0029). Accordingly, Gore et al. set forth that

pH is a relationship with respect to fuel concentration that can be monitored to determine concentration (much like the temperature input of Narayanan et al.). In such a manner, it would have been obvious to substitute the use of temperature input, as taught by Narayanan et al., with a pH (in such a manner that it is used as a secondary concentration input in the same manner), as such a substitution of such concentration determining elements would have provided the predicable result of operating in the same manner (providing a secondary concentration measurement to correct the Nafion sensor measurement, which relies on current). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to replace the temperature input with a pH input (as a corrective factor to concentration), as the substitution of one known concentration measurement for another known concentration determining element would have yielded the predicable result of operating a such (concentration measurement for concentration determination).

16. Claim 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Narayanan et al. as evidenced by/in view of Beckmann et al. in further view of Surampudi et al. as applied to claim1 above, and further in view of US 6794067 (Acker et al.).

As to claim 23, none of Narayanan et al., Beckmann et al., and Surampudi et al. teach of using an alarm reporting unit connected to a control unit in such a manner that an alarm is reported when the alcohol concentration is not within a predetermined range.

However, Acker et al. teach of a methanol fuel cell system, wherein concentration (amount of fuel) is measured (abs; col. 10, lines 1-5). Furthermore, such

the concentration is reported to the control module [324] (control unit), wherein the logic module indicates (visually or audibly) haw much fuel is left (col. 10, lines 12-18). Furthermore, when the fuel is too low (methanol not within a predetermined range), there is a signal [336] sent from logic module [324] indicating that the fuel is too low (thus an alarm unit) (col. 10, lines 21-27). The motivation for indicating such an alarm and control unit (as taught by Acker et al.) is to provide proper fuel level monitoring (col. 10, lines 10-11), can then be used to ensure that the fuel cell is still capable of being operated (i.e. having sufficient fuel). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use an alarm reporting unit hooked up to a control logic unit (as taught by Acker et al.) in order to provide better fuel monitoring capabilities (which can then be used to ensure that an appropriate amount of fuel is left to continue fuel cell operation).

17. Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 58-165274 (Kawana et al.) in view of Surampudi et al. and Beckmann et al.

As to claim 1, Kawana et al. teach of a fuel cell system using methanol fuel (liquid and alcohol) (abs, purpose). As seen in the figure provided by the abstract, the fuel cell has a cathode [1] (oxidant electrode), and anode [3] (fuel electrode), and an ion exchange film [2] (electrolytic membrane). As seen in the figure, there is a container containing liquid fuel (portion containing anolyte [4], as methanol is fed into the anolyte) (abs, constitution). It is noted that thermometer [9], as connected to controller [8] is used a concentration sensor, as concentration is altered with respect to it (abs,

constitution), wherein the thermometer is within the container containing the liquid fuel (figure in abs).

Kawana et al. does not teach (a) that the electrolytic membrane is polymeric or (b) that the concentration detection unit has a polymer membrane wherein the conductivity of the polymer membrane is used to determine the concentration.

With respect to (a), Surampudi et al. teach the same type of a fuel cell (methanol) (abs). It I noted that the embodied the polymer electrolytic membrane [18] is Nafion (col. 3, lines 6-11 and lines 26-26-31; fig. 1). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use Nafion (polymer) as the electrolytic membrane in the system of Kawana et al., as the use of such a known polymer that functions as an electrolytic membrane would have yielded the predictable result of providing the fuel cell with an electrolyte that operated as such. It has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

As to (b), Beckmann et al. teach of a different type of concentration sensor. As seen in fig. 8, Nafion (polymer membrane) is used within a circuit, wherein current passes through it, and resistance is used to determine the concentration (para 0065; fig. 8). (Note resistance and conductivity are related, as resistivity is the inverse of conductivity, and thus a measurement of resistance is related to that of conductivity.) In such a manner, it would have been obvious to substitute the use of temperature input as the concentration sensor (as taught by Kawana et al.) with a sensor using a Nafion

and resistance calculations (as taught by Beckmann et al.), as such a substitution of such concentration determining elements would have provided the predicable result of operating in the same manner. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to replace the temperature based concentration sensing with one using Nafion and resistance (as taught by Beckmann et al.), as the substitution of one known concentration measurement for another known concentration element would have yielded the predicable result of operating a such (concentration measurement for concentration determination).

As to claim 5, it is noted that the combination above (with respect to claim 1) renders obvious a methanol fuel cell with a Nafion electrolyte and a sensor using Nafion. As seen in the figure next to the abs. of Kawana et al., the sensor is put into the same container in contact with the fuel cell. Accordingly, the combination discloses the claimed invention except for the fact that the polymer membrane of the sensor and the polymer electrolytic membrane are integral (that a portion of the polymer electrolytic membrane is used as the polymer membrane). It would have been obvious to one having ordinary skill in the art at the time the invention was made to integrate the electrolytic membrane and the polymer membrane (as they are put in proximity to one another and are made out of the same material), since it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v Detroit Stove Works,* 150 U.S. 164 (1893).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EUGENIA WANG whose telephone number is (571)272-4942. The examiner can normally be reached on 7 - 4:30 Mon. - Thurs., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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